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MINISTRY OF FORESTS

Tree Farm Licence 19

Issued to Doman-Western Lumber Ltd.

Rationale for Allowable Annual Cut (AAC) Determination

Effective August 1, 2001

Ken Baker
Deputy Chief Forester

Table of Contents

Objective of this Document 3
Description of the TFL 3
History of the AAC 3
New AAC determination 4
Information sources used in the AAC determination 4
Role and limitations of the technical information used 5
Statutory framework 6
Guiding principles for AAC determinations 6
The role of the base case 8
Timber supply analysis 9
Consideration of Factors as Required by Section 8 of the *Forest Act* 10
Land base contributing to timber harvesting 10
- general comments 10
- non-productive and non-forested reductions 11
- economic and physical operability 11
- terrain stability 12
- deciduous (broadleaf) stands 13
- roads, trails and landings 13
Existing forest inventory 14
Expected rate of growth 15
- site productivity estimates 15
- volume estimates for existing unmanaged stands 16
- volume estimates for managed stands 17
- minimum merchantability standards 17
- fertilization 18
- utilization standards and compliance 19
Integrated resource management objectives 19
- recreation features 19
- visually sensitive areas 20
- watershed management 21
- riparian habitat 21
- landscape-level biodiversity 22
- stand-level biodiversity 23
- wildlife habitat 24

Other Information 26
- Vancouver Island Land Use Plan 26
Alternative rates of harvest 27
Difference between AAC and actual harvest 28
Community dependence on the forest industry 28
Timber processing facilities 28
Minister's letter and memorandum 28
Local objectives 29
Abnormal infestations and salvage 29
Reasons for Decision 30
Determination 31
Implementation 31
Appendix 1: Section 8 of the *Forest Act* 33
Appendix 2: Section 4 of the *Ministry of Forests Act* 35
Documents attached: 35
Appendix 3: Minister of Forests' letter of July 28, 1994 35
Appendix 4: Minister of Forests' memo of February 26, 1996 35

Objective of this Document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for Tree Farm Licence (TFL) 19. This document also identifies where, I believe, new or better information is needed for incorporation in future determinations.

Description of the TFL

Tree Farm Licence 19 is located on the west coast of Vancouver Island near Nootka Sound. It is bordered by the Strathcona Timber Supply Area and Strathcona Provincial Park to the east, Nootka Sound to the west, Canadian Forest Products Ltd.'s TFL 37 and Weyerhaeuser Company Ltd.'s TFL 39 to the north, and Clayoquot Sound to the south.

The TFL area is composed of a rugged marine coastline, with steep mountainous terrain, and deep river valleys and inlets of the Pacific Ocean. The majority of the operable forest lies within the Coastal Western Hemlock biogeoclimatic zone, with portions in the higher elevation Mountain Hemlock zone. There are also large areas of unforested alpine tundra.

The total land base of the TFL is 191 992 hectares, of which 148 177 hectares are considered to be productive forest. In estimating the timber harvesting land base, the largest deductions from the productive forest are for inoperable stands. Other important deductions are for riparian reserves and wildlife habitat.

There are 6 communities in the TFL, the largest of which are Gold River and Tahsis. Western Forest Products' harvesting operations and the associated sawmill facility in Tahsis are the major employers in the area.

History of the AAC

TFL 19, originally known as Forest Management Licence No. 19, was awarded in 1954 to Tahsis Company Ltd. At that time, under Management Plan (MP) No. 1, the licence area was 161 612 hectares and the company was authorized to harvest 283 170 cubic metres per year. By 1978, the area under the licence area had increased, and with improved utilization standards, updated inventory and productivity estimates, and an expanded timber harvesting land base, the AAC was increased to 989 674 cubic metres.

A 25-year replacement TFL agreement was offered to Tahsis Company Ltd. in 1982. Several name changes and other corporate changes occurred between then and 1997, when the TFL was acquired by Doman-Western Lumber Ltd. The current 25-year agreement was last replaced on January 1, 2001. The TFL is managed by Western Forest Products Limited and is administered from the Campbell River Forest District, as part of the Vancouver Forest Region.

The AAC under Management Plan (MP) No. 8 was 978 000 cubic metres. The term of MP No. 8 was from August 1, 1996 to July 31, 2001, and the AAC supported a Small Business Forest Enterprise Program component of 45 868 cubic metres.

New AAC determination

Effective August 1, 2001 the new AAC for TFL 19 is 940 000 cubic metres, a reduction of 38 000 cubic metres from the previous AAC.

This AAC will remain in effect until a new AAC is determined, which must take place within five years of this determination.

Information sources used in the AAC determination

Information considered in determining the AAC for TFL 19 includes the following:

- *Western Forest Product Limited Tree Farm Licence 19, Timber Supply Analysis Information Package.* Submitted September, 2000, Accepted February 2001;
- *Western Forest Products Limited Tree Farm Licence 19,* Management Plan 9; Submitted August 25, 2000, Accepted August 1, 2001;
- *Western Forest Products Limited Tree Farm Licence 19, Timber Supply Analysis.* Submitted May 10, 2001, Accepted July 9, 2001;
- *Western Forest Products Limited Tree Farm Licence 19 Twenty Year Plan;* Submitted May 11, 2001, Accepted June 20, 2001;
- *Western Forest Products Limited Tree Farm Licence 19, Nootka Sound – Vancouver Island, Sustainable Forest Management Plan, Proposed Management Plan 9.* Submitted May 11, 2001;
- *TFL 19 Inventory Audit,* BCFS Resources Inventory Branch, February, 2001;
- *Vancouver Island Summary Land Use Plan,* February, 2000;
- *Vancouver Island Land Use Plan Higher Level Plan Order,* December, 2000;
- Technical review and evaluation of current operating conditions on TFL 19 through comprehensive discussions with BCFS and MELP staff, notably at the AAC determination meeting held in Victoria on May 15 and 16, 2001;
- Technical information provided through correspondence and communication among staff from BCFS and MELP;
- Summary of public input solicited by the licensee regarding the contents of Management Plan No. 9;
- Letter from the Minister of Forests to the Chief Forester, dated July 28, 1994, stating the Crown's economic and social objectives;

- Memorandum from the Minister of Forests to the Chief Forester, dated February 26, 1996, stating the Crown's economic and social objectives with regard to visual resources;
- Letter from the Deputy Ministers of Forests and Environment, Lands and Parks, dated August 25, 1997, conveying government's objectives regarding the achievement of acceptable impacts of biodiversity management on timber supply;
- Memorandum from the Director of Timber Supply Branch of the Ministry of Forests, dated December 1, 1997, titled *Incorporating Biodiversity and Landscape Units in the Timber Supply Review;*
- *Forest Practices Code of British Columbia Act*, consolidated to March 2001;
- *Forest Practices Code of British Columbia Act Regulations and Amendments*, current as of March 2001;
- *Forest Practices Code of British Columbia Guidebooks*, BCFS and MELP;
- *Identified Wildlife Management Strategy,* Province of British Columbia (B.C.), *February 1999;*
- *Landscape Unit Planning Guide,* Province of British Columbia (B.C.), March 1999*;*
- *Higher Level Plans: Policy and Procedures,* BCFS and Ministry of Environment, Lands and Parks (MELP), December 1996.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester or deputy chief forester to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis, and the inventory and growth and yield data used as inputs to the analysis, typically form the major body of technical information used in AAC determinations. Timber supply analyses and associated inventory information are concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices.

However, the analytical techniques used to assess timber supply are necessarily simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis due in part to variations in physical, biological and social conditions, although ongoing science-based improvements in the understanding of ecological dynamics will help reduce some of this uncertainty.

Furthermore, technical analytical methods such as computer models cannot incorporate all of the social, cultural and economic factors that are relevant when making forest management decisions. Therefore, technical information and analysis do not necessarily provide complete answers or solutions to forest management problems such as AAC determinations. However, the information does provide valuable insight into potential impacts of different resource-use assumptions and actions and thus forms an important component of the information required to be considered in AAC determinations.

In determining the AAC for TFL 19, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for TSAs and TFLs. Section 8 is reproduced in full as Appendix 1. In accordance with Section 23(3) of the *Interpretation Act*, the deputy chief forester is expressly authorized to carry out the functions of the chief forester which include those required under Section 8 of the *Forest Act*.

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. When a large number of determinations are made for many forest management units over extended periods of time, administrative fairness requires a reasonable degree of consistency of approach in incorporating these changes and uncertainty. To make his approach in these matters explicit, the chief forester has compiled a set of guiding principles for AAC determinations. These principles are set out below. If in some specific circumstance it may be necessary to deviate from these principles, I will provide a detailed reasoning in the considerations that follow.

Two important ways of dealing with uncertainty are:

(i) minimizing risk, in respect of which in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining AACs frequently, to ensure they incorporate current information and knowledge, a principle that has been recognized in the legislated requirement to redetermine AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires the chief forester to take into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation of current practices. It is not appropriate to base my decision on unsupported speculation with respect either to factors that could work to increase the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or to factors that could work to reduce the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the *Forest Practices Code of British Columbia Act* and its associated regulations (the Forest Practices Code).

The *Forest Practices Code of British Columbia Regulations* were approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time.

The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995.

Although implementation of the Forest Practices Code has been underway since then, the timber supply implications of some of its provisions, such as those for landscape-level biodiversity, still remain uncertain, particularly when considered in combination with other factors. In each AAC determination the chief forester takes this uncertainty into account to the extent possible in the context of the best available information. In making my determination for TFL 19, as deputy chief forester, I have followed the same approach.

As British Columbia progresses toward completion of strategic land use plans, the eventual timber supply impacts associated with the land-use decisions resulting from the various planning processes—including the Commission on Resources and Environment (CORE) process for regional plans, the Protected Areas Strategy (PAS) and the Land and Resource Management Planning (LRMP) process—are often discussed in relation to current AAC determinations. Since the outcomes of these planning processes are subject to significant uncertainty before formal approval by government, it has been and continues to be the position of the chief forester that in determining AACs it would be inappropriate to attempt to speculate on the timber supply impacts that will eventually result from land-use decisions that have not yet been taken by government. I consider this approach to be reasonable and appropriate. Like the chief forester, therefore, I will not take into account the possible impacts of existing or anticipated recommendations made by such planning processes, nor attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made a formal land-use decision, it may not always be possible to fully analyze and account for the consequent timber supply impact in a current AAC determination. In many cases, government's land-use decision must be followed by a number of detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. Nevertheless, the legislated requirement for five–year AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

However, where specific protected areas have been designated by legislation or by order in council, these areas are no longer considered to contribute to the timber supply in AAC determinations.

For the area of TFL 19, government's approval of the Vancouver Island Summary Land Use Plan (February, 2000) and subsequent Vancouver Island Land Use Plan Higher Level Plan Order (December, 2000) have clarified many aspects of land and resource use and management.

Forest Renewal BC funds a number of intensive silviculture activities that have the potential to affect timber supply, particularly in the long term. As with all components of an AAC determination, like the chief forester, I require sound evidence before accounting for the effects of intensive silviculture on possible harvest levels. Nonetheless, I will

consider information on the types and extent of planned and implemented practices as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of any timber supply effects of intensive silviculture.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to redetermine many outdated AACs in the province between 1992 and 1996. In any case, the data and models available today are improved from those available in the past, and will undoubtedly provide for determinations that are more reliable.

Others have suggested that, in view of data uncertainties, the chief forester should immediately reduce some AACs in the interest of caution. However, any AAC determination made by the chief forester or myself must be the result of applying our individual judgement to the available information, taking any uncertainties into account. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely on the basis of a response to uncertainty. Nevertheless, in making my determination, I may need to make allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent court decisions including those in the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting those obligations under these decisions, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within TFL 19.

With respect to future treaty decisions, as with other land-use decisions it would be inappropriate for me to attempt to speculate on the impacts on timber supply that will result from decisions that have not yet been taken by government.

Overall, in making this AAC determination, as the deputy chief forester, I am mindful of the chief forester's obligation as steward of the forest land of British Columbia, of the mandate of the Ministry of Forests as set out in Section 4 of the *Ministry of Forests Act*, and of the chief forester's responsibilities under the *Forest Practices Code of British Columbia Act*.

The role of the base case

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review program for TSAs and TFLs.

For each AAC determination for a TFL, a timber supply analysis is carried out by the licensee using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model, a series of timber supply forecasts is

produced, reflecting different starting harvest levels, rates of change over time, and potential trade-offs between short- and long-term harvest levels.

From this range of forecasts, one is chosen which attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. This is known as the 'base case' forecast, and forms the basis for comparison when assessing the effects of uncertainty on timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast for a TFL is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer simulation used to generate it. In some cases, an AAC is determined that coincides with the base case starting harvest level. In other cases, an AAC is determined which differs significantly from the initial level modelled.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which I believe its predictions of timber supply should be adjusted, if necessary, to more properly reflect the current situation.

These adjustments are made on the basis of informed judgement, using current available information about forest management, which may have changed since the original information package was assembled. Forest management data are particularly subject to change during periods of legislative or regulatory change, such as the enactment of the Forest Practices Code, or during the implementation of new policies, procedures, guidelines or plans.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but a synthesis of judgement and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case forecast. Judgements that may be based in part on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, once an AAC has been determined, no additional precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined.

Timber supply analysis

The timber supply analysis for TFL 19 was prepared by Western Forest Products Limited with the assistance of Olympic Resource Management Ltd. and J.S. Thrower and Associates Ltd. Complan 3.0, a spatially explicit forest level simulation model developed by Olympic Resource Management, was used to provide the timber supply forecasts. Complan is designed to schedule harvests according to a range of spatial and temporal

objectives assigned to stands. The forecasts from the timber supply model were reviewed by BCFS staff knowledgeable about the model. These staff were able to advise me about the function of this model, and any associated implications for harvest projections.

The timber supply analysis assumptions incorporated current management practices and forest management recommendations arising from the Vancouver Island Summary Land Use Plan and subsequent Vancouver Island Land Use Plan Higher Level Plan Order. I have found this to be a reasonable approach because it is evident that operational planning and statutory approvals have, for several years, unfolded essentially in harmony with the Vancouver Island Summary Land Use Plan recommendations. I accept the use of these modelling assumptions in the estimation of available timber supply on TFL 19, and my considerations of these assumptions are discussed throughout this document.

The base case prepared by the licensee projected an initial harvest level of 937 972 cubic metres per year, a level that is approximately 40 000 cubic metres less than the current AAC. This initial harvest level is forecasted to decline at a rate of about 7.5 percent per decade to a low of 716 951 cubic metres per year in 2051. The forecasted harvest increases in 2061 and attains a long-term harvest level of 782 625 cubic metres per year in the year 2121.

In the timber supply analysis, various sensitivity analyses were conducted to assess the potential implications for timber supply arising from uncertainty in data assumptions and estimates. These analyses have also assisted me in considering the factors leading to my determination.

As discussed and quantified throughout this rationale, and in consideration of the items described above, I am satisfied that the information presented to me provides an adequate basis from which I can assess the timber supply for TFL 19 for this determination.

Consideration of Factors as Required by Section 8 of the *Forest Act*

Section 8 (8)

In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

i) the composition of the forest and its expected rate of growth on the area,

Land base contributing to timber harvesting

- general comments

The total area of TFL 19 is 191 992 hectares. Seventy-seven percent of the area is considered to be productive forest land.

The timber harvesting land base is comprised of those portions of the productive forest land available for harvesting. Some areas are not available for harvest for economic or biological reasons. The areas that are assumed to not be available for harvest, are

excluded from the timber harvesting land base and amount to 59 556 hectares in TFL 19, or approximately 40 percent of the productive forest land.

The following is my consideration of the deductions applied in the derivation of the timber harvesting land base.

- non-productive and non-forested reductions

Based on my thorough review, I accept the exclusion of 43 815 hectares of non-productive and non-forested land from the timber harvesting land base for the purpose of this analysis.

- economic and physical operability

Those portions of the productive forest that are not physically accessible for harvesting, that have very low productivity or that are not expected to be feasible to harvest economically, are categorized as inoperable and are excluded when deriving the timber harvesting land base. A total of 45 064 hectares, or approximately 30 percent of the productive forest, were excluded as inoperable in the timber supply analysis.

During the previous Timber Supply Review, it was assumed that a total of 11 594 hectares classified as inoperable would become operable within 30 years' time. These areas were good and medium growing sites that were not believed to be environmentally sensitive but were thought to be, for the time being, physically or economically inaccessible. The assumed future inclusion of these sites was attributed to anticipated increases in log prices permitting more helicopter-logging, and long-line yarding methods on steeper slopes, and the construction of longer access roads to remote areas. The chief forester expressed some concern about the validity of these assumptions and the licensee was directed to provide updated operability mapping and to track performance across operability categories.

In response to that instruction, the licensee reviewed and updated its operability mapping to reflect current practices. This operability mapping is now based on a complex classification system that takes into account the nature of the forest, the terrain, economic factors, and the capabilities of various harvesting systems. After extensive review, including flights over the TFL, district staff expressed their satisfaction with the operability mapping, while noting some uncertainty related to the accessibility of approximately 375 000 cubic metres located in the Upper Leiner and Burman River systems.

From 1997 to 2000, the licensee tracked the volume harvested, by harvesting system, in both the assumed operable and assumed inoperable land base. While there was very significant year-to-year variability on average approximately 11 to 12 percent of the total volume harvested on the TFL was harvested by helicopter. The operability mapping completed for this determination also indicates that 12 percent of the operable land base (11 756 hectares) will be harvested over time using helicopters.

However, the licensee projects in its twenty year plan that it will harvest approximately twenty percent of the area between 2001 and 2006 using helicopters. As a result, an

assumption is made in the base case that that 20 percent of the area in the next 5 years will be harvested by helicopter.

The licensee conducted a sensitivity analysis showing that all areas categorized as suitable for helicopter logging were excluded from the timber harvesting land base, an immediate reduction in the harvest level to approximately 820 000 cubic metres would be required. These results indicate that short term timber supply on TFL 19 is sensitive to uncertainty in the contribution of areas considered operable using helicopters.

I have considered the operability assumptions made for the base case harvest forecast. Overall, I accept that the operability mapping represents the best available information and is suitable for use in this determination. I also accept the licensee's commitment to harvest a higher proportion of area using helicopters over the next five years, and I therefore accept the assumed higher contribution to timber supply from these areas in the first five years of the forecast period. However, I am mindful that short-term timber supply is shown to be highly dependent on the assumed contribution from helicopter operable areas. Although a review of recent operations indicates a level of harvesting performance has been achieved that is consistent with the assumptions in the operability mapping, the base case harvest projection requires that this performance continue over time. As a result, I request that the actual harvesting performance using helicopters be monitored over the term of this determination. If the contribution assumed in the base case is not realized in operational practice, then I will address the implications for timber supply in a future determination. I will discuss this further under 'Implementation'.

- terrain stability

Terrain stability mapping portrays an assessment of unstable or potentially unstable terrain on forested lands. The process of mapping includes determining the relative potential of landslide initiation and the type of landslide that may occur on different types of terrain, based on the data obtained from a review of available maps, photos, site data, and field observations. Terrain stability Class I is the most stable and Class V is the least stable.

Reconnaissance-level terrain stability mapping was completed for TFL 19 in 1997. In the course of doing operability mapping for this TFL, the licensee reviewed the entire land base, including polygons mapped as Terrain Class IV and V, for their potential availability for harvesting based upon current harvest methods. A significant amount of area mapped as Terrain Class IV (6104 hectares) and Terrain Class V (2622 hectares) on slopes greater than 80 percent is included in the timber harvesting land base used to model the base case. A sensitivity analysis in which this area was excluded from the land base shows that the base case timber supply is very sensitive in the short and medium term to exclusion of this area.

The licensee's Management Plan No. 9 explicitly states that "generally, road construction and harvesting are not proposed in Terrain Class [V] areas.". On the basis of this statement, I have some uncertainty as to whether any Class V terrain is likely to be harvested, and therefore whether any of the area should be assumed to contribute to the timber harvesting land base. However, I am aware that the area of Class V terrain is

assumed to contribute only slightly more than one percent to the timber harvesting land base of the TFL. The base case assumptions, therefore, appear to be consistent with the management plan commitment, and in any event the risk to timber supply of the area not actually being harvestable is small, given the size of the area. I am also aware that a review of the terrain stability assumptions by the Vancouver Region geomorphologist indicated that the reductions applied in the base case for unstable terrain and potentially unstable terrain were acceptable.

Having considered the information, I accept that the base case assumptions were adequate, and I make no adjustment in the determination. However, I request that actual harvesting in these areas be monitored, as discussed further in the 'Implementation' section of this document.

- deciduous (broadleaf) stands

A total of 460 hectares of deciduous stands are included in the timber harvesting land base. These areas are primarily alder stands associated with riparian areas. District staff indicated that because the licensee currently does not utilize deciduous species, these stands should not be included in timber harvesting land base. The licensee performed a sensitivity analysis which showed that excluding the deciduous stands would have a negligible impact on timber supply.

Although it is true that deciduous stands are generally becoming increasingly economic to harvest, I note that the licensee has not harvested such stands in the past and that the timber in question is in areas that may be difficult to harvest. Although I believe it would have been more appropriate to exclude deciduous stands from the timber harvesting landbase, I have determined that any overestimation of the timber supply is not significant for the purposes of this AAC determination.

- roads, trails and landings

In the analysis, productive forest land that would otherwise be considered available for harvesting was excluded to account for the construction of roads. It was assumed that no reductions would be necessary for trails and landings because after logging has been completed they will be immediately rehabilitated to their previously productive state.

Separate estimates were made for existing roads and those that are yet to be constructed. In each case, estimates account for the area that is permanently excluded from the timber harvesting land base.

The licensee identified 9 hectares of polygons in the inventory file classified as roads, with this area being excluded from the timber harvesting land base under *non-productive and non-forested reductions*.

To account for existing roads that are represented as lines in the Geographic Information System (GIS) rather than as polygons, the licensee assumed that these roads would have an average non-productive width of 10 metres. Based on this road width, the licensee excluded 1947 hectares from the timber harvesting land base to account for these roads.

To account for future roads, the licensee developed a spatially explicit projection of the complete road system necessary to harvest the entire timber harvesting land base. The

same assumptions and methods adopted for existing roads were used to calculate the area to be excluded from the timber harvesting land base resulting from future roads. That area was 1454 hectares.

The total area of 3437 hectares removed for roads represents approximately 3.5 percent of the current timber harvesting land base. A review by district staff of reported levels of post-harvest site degradation percentages indicated that approximately 6 percent of harvested areas are covered by roads. District staff believe the road widths assumed in the analysis should have been greater, more in the order of 12 to 15 metres. The licensee asserts that the estimates of district staff do not account for the fact that tree crowns occupy road space and therefore only some of area denuded by roads should be deducted from the timber harvesting land base. In considering this matter, I am not aware of any quantified evidence that would substantiate or refute the licensee's premise.

I commend the licensee for its work in projecting the future road network, as this projection is superior to that often employed in other timber supply analyses. I acknowledge that the assumed road width likely does reflect the widths of some roads on the TFL, such as spur roads and branch roads. However, I suspect that mainlines are indeed wider, and that the 10-metre estimate for the average width of all roads actually underestimates the total loss in productive area resulting from road construction. For the purposes of this determination I conclude that there is a moderate risk that mid- to long-term timber supply has been over-estimated by a small amount, and I will account for this under 'Reasons for Decision'.

Existing forest inventory

The inventory data used for the timber supply analysis were collected during a forest inventory completed in 1989. For the analysis, the inventory file was updated to January 2000 to account for growth, disturbances such as harvesting and fire, and for silvicultural treatments.

In December 2000, BCFS Resources Inventory Branch completed an audit of the 1989 inventory. Audit results for the mature component of the inventory suggest that the inventory is statistically acceptable. Audit results also suggest, however, that site index and species composition for the immature component of the inventory may not be accurate. According to Management Plan No. 9, the licensee recognizes there are deficiencies in the current inventory and plans to upgrade it to the new Vegetation Resources Inventory standards by 2002.

I have considered the information regarding the current forest inventory used in the timber supply analysis, and am satisfied that—subject to the discussion in this rationale—it forms an acceptable basis for this determination.

While I have not described my consideration of these factors in detail in this rationale, I have fully considered the information regarding:

- the existing age class structure of the forest;
- the procedures used to aggregate stands into analysis units;

- the assumptions made about the species mixes that will regenerate on future managed stands;
- the sequencing of harvest (the oldest first rule); and
- the operational adjustment factors applied to volume estimates for managed stands to account for conditions such as less than ideal tree distribution, small non-productive areas, endemic pests and diseases, and age-dependent decay, waste and breakage which cause yields to be reduced over time.

Having reviewed and discussed these factors with BCFS staff, I am satisfied that the analysis assumptions regarding of all these factors were appropriate, and in this regard I accept the base case as modelled.

Expected rate of growth

- site productivity estimates

The productivity of a site largely determines how quickly trees grow. This in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced, and the ages at which a stand will satisfy mature forest cover requirements and reach a merchantable size. Site productivity is often expressed in terms of site index, which is based on a stand's height as a function of its age. For this analysis, the licensee obtained site index values from two different sources: the TFL 19 forest cover inventory database and estimates based on the Site Index – Biogeoclimatic Ecosystem Classification (SIBEC) system.

The site index from the inventory database was assigned to all existing stands older than 40 years.

For most currently existing stands less than age 41 years and all stands regenerating in the future, the following procedure based on SIBEC site indices was used for estimating site index:

- The licensee produced a Biogeoclimatic Ecosystem Classification Site Series map of TFL 19 using a Terrestrial Ecosystem Mapping (TEM) methodology.
- For each polygon in the TFL 19 inventory file, the licensee estimated a site index by first identifying estimates from two sources, namely
    - the predicted productivity of those site series from the publication "*Site index estimates by site series for coniferous tree species in British Columbia*" (1997), and
    - local site index information by site series by variant for TFL 37, an adjacent and ecologically similar area, to produce an estimate of site index for each polygon in the TFL 19 inventory file.

The information for TFL 37 had been derived in a project designed to adjust the provincial standard SIBEC site index estimates to local site index estimates that more accurately reflect the productivity of areas on TFL 37.

- For each analysis unit in the TFL 19 timber supply analysis, the licensee calculated an area-weighted average site index for both the provincial standard SIBEC estimates and the estimates derived for TFL 37. The mid-point between these two estimates was then used as the site index estimate for the analysis unit.

This derived site index estimate was applied to all future managed stands. It was also applied to stands less than 41 years old that were located in a site series for which a site index estimate was available for the leading species of the stand. If no estimate was available, provincial site index conversion equations were used to determine the site index of the leading species based on the site index of a minor species. If no site index was available for the minor species or no conversion equation was available, the inventory site index was used.

BCFS staff note that the terrestrial ecosystem map completed by the licensee for TFL 19 has not yet been reviewed by government staff.

Staff from the BCFS Research Branch reviewed and accepted the assignment of site indices used in the base case. Although I feel that assigning site index by using the mid-point between a provincial standard SIBEC site index and a TFL 37 estimate for the same site series is somewhat arbitrary, I do not believe it to be unreasonable. I note that a sensitivity analysis using only TFL 37-based estimates indicates no significant change in short-term timber supply relative to the base case.

Another sensitivity analysis indicates that timber supply in the mid- and long-term is very sensitive to the use of the SIBEC-derived site indices rather than site indices derived from the inventory database. However, BCFS Research Branch staff are confident that estimates derived using SIBEC are more reliable than those based on the inventory information.

I commend the licensee in attempting to refine site productivity information on TFL 19. Having reviewed the information and discussed it with BCFS staff, I accept that the site indices for future managed stands assumed in the base case are a better representation than those derived using the inventory information. However, I am aware that the Terrestrial Ecosystem Mapping has not yet been reviewed and endorsed by government staff, and I request that this occur over the term of this determination. I will speak to this further under 'Implementation' at the end of this document.

- volume estimates for existing unmanaged stands

Stands 41 to 120 years of age were considered to be "natural" because they largely originated before there was active forest management in the TFL. For these stands the licensee developed a set of "natural stand yield tables" using the Variable Density Yield Prediction System (VDYP) version 6.4, which was developed by BCFS Resources Inventory Branch based on growth in natural stands. The licensee's yield tables were approved by Resources Inventory Branch staff, and were used to estimate the volume per hectare that will be present over time for any given analysis unit for stands currently aged between 41 and 120 years and used for the timber supply analysis.

Volumes of unmanaged stands that are older than 120 years of age were assumed to be constant within an analysis unit regardless of the age of the stand. The volumes were

determined using the current area-weighted average volume derived for each analysis unit using VDYP. The licensee assumed that there would be no change in net volume in these stands over the forecast period. The BCFS Resources Inventory Branch reviewed this approach and found it acceptable for this analysis.

The licensee provided a sensitivity analysis to examine the impact on timber supply of varying existing stand volumes by plus and minus ten percent. While the analysis showed that the short-term timber supply is very sensitive to estimates of natural stand volume, there is no evidence to suggest that the estimates used in the base case are incorrect. I note that the licensee has expressed an interest in conducting a re-inventory to Vegetation Resources Inventory RIC standards, subject to funding, prior to the next determination, and I encourage proceeding with that work.

Having reviewed the volume estimates for existing natural stands, I am satisfied that acceptable procedures were followed and that projected yields have been reasonably applied in the analysis. I therefore accept the information as suitable for use in this determination.

- volume estimates for managed stands

All existing stands less than 41 years old were assumed to be managed. In the analysis, the licensee used the Table Interpolation Program for Stand Yields (TIPSY) to estimate volumes for these stands. All existing managed stands were assumed to be planted, species composition was obtained from the inventory, and establishment densities were assumed to be ten percent higher than free-to-grow densities typically attained in practice. A genetic gain of two percent for Douglas-fir in stands less than 21 years old was also assumed.

Separate tables were generated for future managed stands using TIPSY. The licensee's assumptions and the tables themselves were reviewed and accepted by Research Branch staff. I have reviewed the relevant information and am satisfied that the volume estimates were reasonably projected, and that the estimates are suitable for use in this determination.

- minimum merchantability standards

Minimum merchantability standards are an estimate of the earliest age and lowest volume per hectare at which a forest stand has reached a harvestable condition. These standards are based on the economic factors affecting forest harvesting in an area and on the requirements of mills for different types of wood products. Constraints on harvesting which arise from managing for other forest values such as visual quality or wildlife habitat, will in fact cause many stands to be harvested at older ages or higher volumes than would be the case if only the minimum merchantability standards were determinative.

In the base case modelling, existing and regenerated stands in TFL 19 were assumed to be merchantable when stand age reached 60 years, provided stand volume had reached 350 cubic metres per hectare.

The licensee prepared sensitivity analyses to assess the timber supply impacts of adjusting the minimum merchantability standards. The results indicate that the harvest level in the fourth decade (2031 to 2041) is extremely sensitive to adjusting the minimum age component. If the minimum age was set at 70 years in the model, initial harvest levels could only be maintained for one decade before declining. Conversely, if the minimum age was set at 50 years, initial harvest levels could be maintained for three decades before declining. These results illustrate that mid-term harvest levels are sensitive to the age at which managed stands become available for harvest, as managed stand volumes begin to contribute significantly to timber supply in the fourth decade of the forecast period.

BCFS District staff reviewed the minimum merchantability standards used in the timber supply analysis, and indicated that they are reflective of current practice.

For this determination, I accept as reasonable the minimum merchantability standards assumed in the base case.

- fertilization

Since 1970 approximately 4 500 hectares on TFL 19 have been fertilized to improve the growth of trees. In the base case, the licensee assumed that a small area of regenerating Douglas-fir will be fertilized in the future.

I believe that this small amount of fertilization should not have been assumed in the base case because the funding for this activity is assumed to come from Forest Renewal BC, and that funding is not certain. However, I am satisfied that any overestimation of timber supply attributable to this factor is insignificant. Therefore, I will make no adjustment because of this factor.

ii) the expected time that it will take the forest to become re-established on the area following denudation,

iii) silviculture treatments to be applied to the area,

iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

I have reviewed, discussed with BCFS staff, and considered information regarding:

- delay in regeneration between harvesting and the time that a minimum acceptable number of trees are established;
- the amount of area that is currently not satisfactorily re-stocked;
- the improvement in yields and growth rates that can be expected because of the use of genetically improved stock;
- the amount of spacing of young stands that occurs;
- the harvesting systems that will be used; and
- estimates of decay, waste and breakage.

I am satisfied that the base case assumptions regarding these factors were appropriate for this determination.

- utilization standards and compliance

Utilization standards define the species, dimensions and quality of trees and logs that must be harvested and removed from an area during harvesting operations. The utilization standard assumed in the base case for all existing managed stands (up to 40 years old) and for all future managed stands was a 12.5-centimetre diameter at breast height (dbh) with a 30-centimetre maximum stump height and 10-centimetre minimum top diameter inside bark. For all existing stands over age 40 years the utilization standard assumed was a 17.5-centimetre diameter at breast height (dbh) with a 30-centimetre maximum stump height and 15-centimetre minimum top diameter inside bark.

District staff indicate that in operations the utilization standard for existing stands aged 41 to 140 years is identical to that assumed for managed stands less than 41 years of age. Therefore, timber supply is probably underestimated slightly in the base case. I believe that this is an insignificant issue and that the base case adequately reflects current utilization and compliance standards.

v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production,

Integrated resource management objectives

The Ministry of Forests is required under the *Ministry of Forests Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are co-ordinated and integrated. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

To manage for resources such as water quality and aesthetics, current harvesting practices limit the size and shape of cutblocks and the amount of disturbance (areas covered by stands of less than a specified height), and prescribe minimum green-up heights for regenerated stands on harvested areas before adjacent areas may be harvested. Green-up requirements provide for a distribution of harvested areas and retention of forest cover in a variety of age classes across the landscape.

I have reviewed the information presented to me regarding the base case assumptions for cultural heritage resources, karst features and cut block adjacency, and I am satisfied that the base case has appropriately reflected operational constraints related to these factors.

- recreation features

The area of TFL 19 is used for a variety of recreational pursuits, including fishing, hiking, kayaking, caving and mushroom picking.

The licensee completed a Recreation Features Inventory in 2000 to identify areas that needed, in the base case modelling, to be excluded from the timber harvesting land base in order to anticipate protection of recreation resources. For areas with high or very high

feature significance, the licensee excluded 100 percent of the areas with high sensitivity and 50 percent of the areas with moderate sensitivity.

District staff are concerned that this approach may over-estimate the actual impact of protecting the recreation resources in question. They are also concerned that no land base reduction was modelled for areas with moderate and low feature significance and sensitivity classes, even though operational practice may indicate an impact on timber supply in some cases. I note, however, that two separate sensitivity analyses, applying more constraining and less constraining assumptions than those applied in the base case, show very little difference in projected harvest flow.

After considering the available information, I accept that the assumptions used in the base case are not entirely reflective of the management for recreation features. However, I expect that the differences between current management requirements and the analysis assumptions are minor, and I note that the sensitivity analyses showed timber supply to be insensitive to uncertainty in the assumptions. As a result, I make no adjustments on this account for this determination.

- visually sensitive areas

A visual landscape inventory was completed in 2000. This inventory indicates that approximately 40 percent of the timber harvesting land base is in visually sensitive areas with objectives for maintaining forest cover. These objectives were modelled by allowing the maximum in the range of allowable disturbance for each visually sensitive zone to be covered with stands less than five metres in height (i.e., up to 25 percent of the forested area in the modification zone, 15 percent in the partial retention zone, 5 percent in the retention zone and one percent in the preservation zone). District staff advised that the licensee employs good cutblock design in visually sensitive landscapes, and as a result the assumptions around maximum allowable disturbance are likely reasonable.

The licensee conducted a sensitivity analysis in which the mid-point of the allowable disturbance range for each zone was used. That analysis showed a significant reduction in timber supply in the sixth decade compared to the base case projection. Harvest flow was not controlled in the sensitivity analysis in the same manner as in the base case. Meeting specific harvest flow objectives would likely have resulted in a short-term timber supply impact, or a more precipitous decline to the mid-term harvest level.

Having reviewed the information regarding visually sensitive areas, I am generally satisfied that the analysis assumptions were an appropriate reflection of current practice, and I make no adjustments for this determination. However, I note that if future management in visually sensitive areas indicates that a lower level of disturbance than assumed in the analysis is required to meet objectives, timber supply would be reduced in either the short or mid term. As additional information becomes available on management in visually sensitive areas, any implications to timber supply can be taken into account in a future determination.

- watershed management

The only community watershed within the TFL area is McKelvie Creek. In the base case analysis, the licensee applied a cover constraint such that no more than five percent of the productive forest area in the watershed could be covered with stands less than 5 years in age. I accept that as a reasonable assumption.

Twenty-four drainages in the TFL have been subject to a full evaluation under the Coastal Watershed Assessment Procedures. While the status of some of these watersheds is a concern to District staff, I am not aware of any reason why a constraint should have been applied in the analysis to account for management of the watersheds, and none was assumed in modelling the base case. I believe that any watershed related issues which may arise can be adequately addressed during operational planning.

I accept the method of modelling watershed considerations as the best available information and as suitable for use in this determination. I encourage district staff to monitor the operational experience in managing watershed issues so that any issues can be identified prior to the next AAC determination.

- riparian habitat

Riparian habitat occurs along streams and around lakes and wetlands. In certain circumstances, the Forest Practices Code requires the establishment of riparian reserve zones (RRZs) that exclude timber harvesting, and riparian management zones (RMZs) that restrict timber harvesting in order to protect riparian and aquatic habitats. For each stream, lake or wetland, the RRZ and RMZ make up the entire riparian management area. Stream classes are described in the *Riparian Management Area Guidebook* and are determined based on presence of fish, occurrence in a community watershed, and average channel width criteria. Stream class is the basis for determining the width of an RRZ and an RMZ. Similar criteria are used to classify lakes and wetlands and estimate reserve zone and management zone retention.

On TFL 19 all "double line streams" (i.e., streams represented as areas in the GIS database), lakes and wetlands have been classified and were assigned an RRZ based on their classification. A complete survey of "single line streams" (i.e., represented as lines in the GIS database), has not been completed for TFL 19. To estimate the area in RRZs and RMZs around single line streams, the licensee sampled single line streams that have been classified (totalling 1684 kilometres). The licensee determined that the weighted average reserve width for all fish bearing stream classes in the sample was 28.4 metres. The licensee rounded this estimate to 30 metres and applied it to all classified streams and all unclassified streams with a slope less than 6 percent (assumed to be fish bearing) under the assumption that the retention in the sample represents retention for streams on the entire TFL. The licensee also assumed that rounding the RRZ width to 30 metres would roughly account for the basal area retention in RMZs not accounted for elsewhere as wildlife tree patches or other land base reductions. The resulting reduction for the riparian reserve and management area totalled 3972 hectares.

District staff indicate that the licensee routinely leaves a substantial volume in Riparian Management Zones. Some of this volume may be accounted for in the possible over-

estimate in the amount of area assumed to be left in Wildlife Tree Patches, many of which are in Riparian Management Zones. I will discuss this issue under *stand level biodiversity*.

For the purposes of this determination, I accept the assumptions used in the base case for Riparian Reserve and Management Zones as the best available information. The licensee has made a commitment in Management Plan No. 9 to complete a Fish and Fish Habitat Inventory to RIC standards. This inventory will eliminate much of the uncertainty around the estimates of the area in Riparian Reserve and Management Zones. I also encourage the licensee to clearly document the actual practice in Riparian Management Zones so that improved information will be available for the next AAC determination.

- landscape-level biodiversity

Biodiversity is defined as the full range of living organisms, in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems and the evolutionary and functional processes that link them. Under the Forest Practices Code, biodiversity in a given management unit is assessed and managed at both the landscape and stand levels.

Achieving landscape-level biodiversity objectives involves maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures, across a variety of ecosystems and landscapes. A major feature of managing for biodiversity at the landscape level is leaving sufficient and reasonably located patches of old-growth forests for species that are dependent on, or are strongly associated with, old-growth forests. Although some general forest management practices can broadly accommodate the needs of most ecosystems, more often a variety of practices is needed to represent the different natural disturbance patterns under which ecosystems have evolved.

A forest district manager's delineation and formal designation of 'landscape units' is a key component of a sub-regional biodiversity management strategy. A landscape unit is generally up to 100 000 hectares in size, and is based on topographic or geographic features such as a watershed or series of watersheds. For each landscape unit, the Vancouver Regional Landscape Unit Planning Strategy (RLUPS) has recommended (draft) Biodiversity Emphasis Options (BEOs) as the basis for specifying the percentage of forest that should be retained as Old Growth Management Areas. For the base case analysis, it was assumed that all landscape level biodiversity requirements would be met entirely from within the boundaries of TFL 19.

The *Biodiversity Guidebook*, the *Landscape Unit Planning Guide*, the publication entitled *Higher Level Plans: Policy and Procedures*, and the Deputy Ministers' letter mentioned at the beginning of this document all provide policy and guidance on management for landscape-level biodiversity. The *Landscape Unit Planning Guide* provides advice on which components of the full range of recommendations included in the *Biodiversity Guidebook* should be implemented to achieve a balance among forest management objectives. The *Landscape Unit Planning Guide* recommends percentages of old-seral forest cover to be retained at the biogeoclimatic variant level within each landscape unit. The recommended retention levels are stated as a minimum percentage of the productive

forest to be retained in stands above a specified age, the percentages varying by ecosystem type. In landscape units subject to a lower BEO, the *Guide* allows for old-seral forest cover to be phased in over three rotations rather than achieved immediately.

The 1996 Higher Level Plans: Policy and Procedures guide provides further policy guidance. It outlines three BEOs—lower, intermediate and higher—that may be employed when establishing landscape biodiversity management objectives for a landscape unit. To achieve a balance between biodiversity and timber supply objectives, the guide recommends that a mix of BEOs be adopted in each subregional planning area. The document recommends that the proportions of a planning area subject to lower and intermediate BEOs should range from 30 to 56 percent, with the average at approximately 45 percent of the area subject to lower, 45 percent to intermediate, and 10 percent to a higher BEO (i.e., a 45/45/10 mix).

Because the forest district manager has not yet established BEOs for the landscape units covering TFL 19, the licensee modelled the base case by pro-rating old-growth retention percentages on the basis of a 45/45/10 mix of BEOs in each variant in each landscape unit. A further assumption was made that the old-seral forest requirement on the 45 percent of the area in the lower BEO could be initially reduced to one-third of the full recommended retention percentage, with younger stands being reserved - or recruited - to meet the full retention by the end of three rotations (210 years).

A sensitivity analysis was performed to determine the impact on timber supply of applying the draft BEOs from the RLUPS for each landscape unit. The results show a significant reduction in timber supply in the fourth and sixth decades. With the RLUPS and the VILUP having been finalized, and with the Vancouver Island Land Use Plan Higher Level Plan Order having been promulgated, I believe it is likely that when final landscape unit boundaries and BEOs are established, they will be little changed from the draft boundaries and BEOs. As a result, I expect that future timber supply reductions will be required on TFL 19 to accommodate the requirements of final BEO establishment. Nevertheless, consistent with my Guiding Principles, I will not take into account the implications to timber supply until such time as BEOs are formally established on TFL 19.

As a further note, in the base case the licensee inadvertently applied Natural Disturbance Type (NDT) 1 old seral targets on approximately 5 percent of the forested land base, when in fact the area in question is actually classified as NDT 2. Since the recommended retention levels of old-seral forest in NDT 2 are less demanding than they are in NDT 1, I believe that timber supply is slightly underestimated in the base case projection on this account, and I will discuss this under 'Reasons for Decision'.

- stand-level biodiversity

Stand-level biodiversity management includes retaining wildlife tree patches (WTPs), within or adjacent to cutblocks to provide structural diversity and wildlife habitat. The *Biodiversity Guidebook* makes recommendations for percentages of area to be retained in WTPs, based on specific assumptions about the land base. *The Landscape Unit Planning*

Guide reflects the principles described in the *Biodiversity Guidebook*, and describes the policy on implementing stand-level biodiversity management.

The Campbell River Forest District Standard Operating Procedures for Stand Level Wildlife Tree Management specify that 10 percent of a cutblock's gross area should be retained for maintenance of stand-level biodiversity. District staff indicate that they assume that 75 percent of the area to be retained will likely already be excluded for other reasons (e.g., gullies, riparian reserve zones, etc.), and the net incremental impact of retaining wildlife tree patches will be to reduce timber supply by about 2.5 percent.

The licensee states that operational experience indicates that 13 percent of the productive forest is being retained as WTPs. Like district staff, the licensee estimates that 75 percent of the area serving as WTPs is in fact being retained for other reasons, so that the net incremental impact of retaining WTPs is to lower timber supply by 3.25 percent (i.e., 25 percent of 13 percent). For base case modelling, the licensee rounded that amount up to 4 percent on an assumption that the additional 0.75 percent reflects gully management and Riparian Management Zone reductions that have not been accounted for elsewhere. For the purposes of the analysis, the area in WTPs was treated as a uniform 4 percent reduction in volume.

Although the assumption made by the licensee slightly underestimates timber supply, relative to the direction provided by district staff, I accept the way in which the base case modelling based on an assumed 4 percent reduction for WTPs for two reasons. First, I believe the assumed 13 percent retention level appears to reflect current management on the TFL, and second, I believe it is reasonable to "round up" to 4 percent to account for gully management and Riparian Management Zone reductions that have not been accounted for elsewhere.

For this determination, I am satisfied that the analysis assumptions appropriately reflect the best available information and current management of stand-level biodiversity. I encourage the licensee to monitor the location and actual extent of WTPs and the degree to which they overlap areas retained for riparian management and other purposes. I anticipate better empirical data being available for the next AAC determination.

- wildlife habitat

TFL 19 provides habitat for a number of large wildlife species, including black bear, deer, and elk, and numerous small mammals, bird and fish species. In the period since the last AAC determination, areas that were formerly classified as Environmentally Sensitive Areas for deer and elk were identified by the district manager as ungulate winter range under the Operational Planning Regulation (OPR).

In accordance with section 69(2) of the OPR, an ungulate winter range that is identified in a wildlife management plan or strategy approved before October 15, 1998 ceases to be an ungulate winter range on October 15, 2003 unless confirmed before that date by the chief forester and Deputy Minister of Environment, Lands and Parks. The process leading to the confirmation of ungulate winter ranges is ongoing and is expected to result in an overall exclusion from the timber harvesting land base of approximately 4000 hectares, the area that was removed in the base case for the current management plan.

Currently, 2439 hectares of ungulate winter range have been identified and these were excluded from the timber harvesting land base in the base case analysis. For 2812 hectares in the timber harvesting landbase formerly classified as EW2 – which the licensee called "potential wildlife habitat reserves" - the licensee modelled a forest cover requirement allowing no more than 50 percent of the areas to be covered with stands less than 140 years of age.

I am aware that staff who are now in the Ministry of Water, Land and Air Protection are concerned with the way the potential wildlife habitat reserves have been modelled, preferring instead that approximately half the area be excluded from the timber harvesting land base. In this context I note that a sensitivity analysis in which a more onerous constraint was applied to the "potential wildlife habitat reserves" (i.e., allowing no more than 50 percent of these areas to be covered with stands less than 250 years of age) had only a minor impact on the short term timber supply.

After considering this factor, I am satisfied that the assumptions used in the base case were adequate for this determination. I am mindful that the process of identifying and confirming ungulate winter ranges is ongoing and that some "potential wildlife habitat reserves" may become designated old growth management areas. I expect that this process will be completed or nearly completed in time to inform the next AAC determination.

- *identified wildlife*

'Identified wildlife' refers to species at risk (red- and blue-listed) and to regionally significant species which are potentially affected by forest management activities and which may not have been adequately accounted for with existing general management strategies, such as those for biodiversity, riparian management, ungulate winter range or through the application of other forest cover objectives. Species at risk as defined under the Forest Practices Code also include those that are not considered at risk provincially but which may be threatened at a regional population level. Addressing the specific habitat needs of 'regionally important wildlife' will lessen the possibility that they will become threatened or endangered at a provincial level.

Volume I of the Identified Wildlife Management Strategy was released in February 1999. It lists several species which may occur and may require future consideration in the TFL 19 area, including Pacific Water Shrew, Keen's Long-Eared Myotis, Queen Charlotte Goshawk, and Marbled Murrelet. Volume II, which has yet to be released, may identify additional species.

The species identified in Volume I will be managed through the establishment of wildlife habitat areas (WHAs) and implementation of general wildlife measures, or through other management practices specified in higher level plans. One WHA for Keen's Long Eared Myotis has been established on TFL 19 and was reflected in the analysis by excluding an area of 28 hectares from the timber harvesting landbase. No other requirements for identified wildlife were assumed in the base case.

Based on data accumulated on habitat requirements for identified wildlife species throughout the province, government experts have estimated that future WHAs may

reduce short-term timber supply across the province by about one percent. Government has committed to limiting the impact of WHAs to this level in the short-term.

I am mindful that the only WHA established within the boundaries of TFL 19 to date is the one mentioned above. Given the Province's commitment to implement the IWMS, however, I expect that other WHAs will eventually be established in the area. Although at this time no one can specify the exact location or precise amount of additional habitat area that will be so designated, I am mindful of government's commitment to limit short-term timber supply impacts to one percent province wide. I believe it is appropriate to assume that WHAs will ultimately lower timber supply by up to one percent in the long term, relative to the base case projection, and I will discuss this further under 'Reasons for Decision'.

I encourage the appropriate government and licensee staff to assess the need for WHAs and appropriate general wildlife measures. The establishment of such areas would bring greater certainty not only to operational planning, but also to the next AAC determination.

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

Other Information

I have reviewed the other information presented to me related to the capability of the area to produce timber, including the licensee's twenty-year plan, harvest sequencing, and first nations considerations, and have taken those into consideration in my determination.

- *Vancouver Island Land Use Plan*

The Vancouver Island Land Use Plan was approved by the provincial government in 1994. Since then, a number of implementation actions have been taken including further clarifications of the plan's intent. The Vancouver Island Summary Land Use Plan in 2000 brought together additional direction for resource management zones and other features of the plan.

The Forest Practices Code enables certain features of strategic land use plans to be established as a higher level plan, with which operational plans, such as forest development plans, are legally required to be consistent. The three ministers with statutory decision-making authority formally established higher level plan resource management zones (RMZs) and objectives for Vancouver Island in December 2000. The zones and objectives are specified in the *Vancouver Island Land Use Plan Higher Level Plan Order* (the VILUP Order).

The key features of the VILUP Order that affect timber supply relate to requirements for green-up, cutblock size, visual resources and landscape unit planning.

About 63 percent of the timber harvesting land base in TFL 19 lies within enhanced forestry zones (RMZs 18, 19, 21, 23 and 24) specified in the VILUP Order. Thirty-three percent lies within the general forestry zones (RMZ 16 and 22) and 3 percent lies within special management zones (SMZ 6 and 11).

For the enhanced forestry zone, the VILUP Order allows cutblocks to be larger than the maximum 40 hectares established for the Coast in the Operational Planning Regulation (OPR). It also allows green-up heights to be reduced from the minimum of 3 metres established in the OPR to a minimum of 1.3 metres. This is subject to determination by the forest district manager that relaxation of cut-block size or green-up constraints will not significantly impact specific hydrological, wildlife, biodiversity, scenic, or recreation values.

In the special management zones, the VILUP Order limits cutblocks to a maximum of 5 hectares for clearcut and clearcut with reserve systems, or 40 hectares if shelterwood, selection, or retention silvicultural systems are applied. Also, through landscape unit planning, mature forest retention targets must be set between 25 and 33 percent of the total forested area for each SMZ. One objective for SMZ 11 (Schoen –Strathcona) is that retention of old-seral forest should be effected at the site series level, a requirement which I believe may have an impact on timber supply that was not reflected in the base case modelling.

The licensee asserts that the modelling of current management constraints such as Visual Quality Objectives and Forest Practice Code requirements adequately reflects the impact of most VILUP Order objectives, and hence no additional forest cover objectives need to be modelled in the base case, other than the reduction in the enhanced forestry zone to a 1.3-metre green-up height.

The licensee did provide a sensitivity analysis in which a 5-hectare maximum block size in the special management zones was modelled. The analysis indicated that if a 5-hectare maximum block size is instituted in this area, overall timber supply would be unaffected except for a reduction of about seven percent in the sixth decade.

I note that in the summary of public comment about Management Plan No. 9 significant concerns were expressed about forest management in the Zeballos Lake sub-basin portion of Special Management Zone #6. These concerns related to reserves for wildlife and biodiversity. I expect these concerns to be addressed through the licensee's commitment to hire a professional biologist to undertake an assessment of wildlife and biodiversity for the entire TFL, and through the ongoing process of identifying wildlife habitat reserves, discussed elsewhere in this document.

I conclude that timber supply in the mid-term has been over-estimated because the base case did not reflect constraints in the special management zones. I will speak to this under 'Reasons for Decision'.

(b) the short and long-term implications to British Columbia of alternative rates of timber harvesting from the area,

Alternative rates of harvest

I have reviewed the alternative rates of harvest modelled by the licensee and have taken that information into consideration in my determination.

Difference between AAC and actual harvest

I have reviewed the actual harvest over the past five years relative to the AAC, and have considered that information in my determination.

Community dependence on the forest industry

As discussed below, the timber harvested under authority of TFL 19 significantly contributes to the fibre used by several mills on Vancouver Island and in the lower mainland area of BC.

BCFS staff provided me with information on community dependence and employment related to the forest management activities on TFL 19. It has been estimated that 2,236 people are directly employed by operations on the TFL and that employment generates over 580 person years of employment per year. While less than one-quarter of the employment occurs on the TFL landbase, I note that it is very important to local communities located by virtue of their relatively small size.

Having reviewed this information, I am aware that several communities benefit from, and some communities are very dependent on, employment opportunities provided by forest management activities related to TFL 19. This is an important factor in my determination.

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

Timber processing facilities

BCFS staff advised me that the timber harvested from TFL 19 is important to timber processing facilities within the TFL, elsewhere on Vancouver Island, and throughout the lower mainland of BC. I am particularly mindful that approximately one-half of the volume processed by the sawmill in Tahsis originates on TFL 19.

As part of the public comment about Management Plan No. 9, significant concern was expressed about the possible closure of the sawmill in Tahsis. I note that there is a Government transition team in place to deal with the potential closure, and that a review is underway to determine if Job Creation Plan commitments have been fulfilled in light of the mill having been shut down for significant periods.

I am mindful of the reliance of timber processing facilities on the volume harvested in the TFL and have taken this into account in my 'Reasons for Decision'.

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia,

Minister's letter and memorandum

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 3) and a memorandum dated February 26, 1996, (attached as Appendix 4). The

letter and memorandum include objectives for forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability.

The Minister stated in his letter of July 28, 1994, that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. To encourage this the Minister suggested consideration of partitioned AACs.

I have considered the contents of the letter and memorandum in my determination.

Local objectives

The Minister's letter of July 28, 1994, suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives.

The licensee has received a limited number of public comments on its draft Management Plan No. 9 including its timber supply analysis information package. The licensee has responded to the comments and BCFS district staff confirm that the licensee has met its public input obligations.

I have considered public comments and the licensee's responses in this determination. I am satisfied that the issues identified in the public review have been adequately addressed under the appropriate factors in this document and that no additional significant concerns have been raised that would affect this determination.

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Abnormal infestations and salvage

A number of parasites, fungi or plants can kill trees or degrade the quality and value of logs. Unsalvaged losses are timber volumes destroyed or damaged by causes such as fire and disease that are not recovered through salvage operations.

Estimates for unsalvaged losses account for epidemic (abnormal) infestations that are not incorporated into yield estimates used in the analysis. Timber volume losses due to insects and diseases that normally affect stands (endemic losses) are mostly accounted for in inventory sampling for existing timber yield estimation or through other methods.

The licensee has relatively good records about unsalvaged losses and estimates that an average annual loss of 2375 cubic metres of volume can be expected annually. This loss is expected to be due primarily to windthrow, although minor losses from disease and insect infestation can be expected. Losses due to fire are expected to be minimal.

District staff have reviewed the estimates for unsalvaged losses. Although the assumed amount of loss is in the expected range, they identified the need for more complete accounting of unsalvaged losses, particularly with respect to windthrow events. For the purposes of this determination I will accept the estimate of unsalvaged losses as the best available information, but will speak to this factor in the 'Implementation' section of this document.

Reasons for Decision

I have considered the information discussed throughout this document, and I have reasoned as follows.

For the reasons stated in 'Timber Supply Analysis' and after considering all the factors recorded above, I accept that the licensee's base case is an appropriate basis for assessing timber supply for this AAC determination

Nevertheless, I have identified factors which, considered separately, indicate that the timber supply may be either greater than or less than projected in the base case. Generally, some of these factors can be quantified and their impacts assessed with some reliability. Others may influence timber supply by adding an element of risk or uncertainty to the decision, but cannot be reliably quantified at this time. These latter factors are accounted for in determinations in more general terms.

I conclude that three factors indicate the timber supply projected in the base case may be *overestimated*:

- identified wildlife: I conclude that the eventual establishment of WHAs and other measures to manage for identified wildlife may result in a decrease of up to one percent in mid- to long-term timber supply relative to the base case modelling.
- roads, trails and landings: The assumptions made and method used to model this factor indicate to me that there is a moderate risk of an unknown decrease in mid- to long-term timber supply. I estimate this risk to be in the range of 0 to 3 percent.
- Vancouver Island Land Use Plan: The area of TFL 19 is subject to the recently approved Vancouver Island Land Use Plan Higher Level Plan Order. In the section of this document entitled *Vancouver Island Land Use Plan*, I discussed how the Order is reflected in the analysis and what I considered the effect of the plan to be in general terms. I specifically noted that the lack of accounting for the maximum 5-hectare cutblock size limit in special management zones introduces a high probability of a decrease in timber supply in the sixth decade.

All of these factors influence the mid- to long-term timber supply for TFL 19. In addition, I have identified one factor which indicates that the timber supply in the base case may be *underestimated*. A slight increase in timber supply over the forecast period is likely because in the base case 4.7 percent of the total productive forest area was assumed to be in NDT 1 when in reality the area falls within NDT 2. Since the old seral retention requirements for NDT 2 are less restrictive than those for NDT 1, timber supply was underestimated on this account. However, the slight underestimation of timber

supply on account of this factor does not serve to mitigate the downward influences exerted by the three factors discussed above. I am mindful that the base case harvest forecast indicates that an immediate 4 percent reduction to the current AAC, and subsequent decreases in the harvest level of approximately 4 percent every five years for the next twenty years, will be required to attain a long-term sustainable harvest level on TFL 19 without significant disruptions in timber supply. The base case projection illustrates that timber supply for this unit is clearly declining. The above set of factors indicate to me that mid to long-term timber supply may be less stable than indicated in the base case harvest forecast.

In addition to the factors listed above, I am aware that there are other factors influencing timber supply on TFL 19, which I am not taking into account in this determination, but which may act to further reduce timber supply in the future. The assumptions around operability and terrain stability require monitoring of operations to ensure that practices continue to support the analysis assumptions around the timber supply contributions from specific areas, as discussed earlier in this document. In addition, the eventual establishment of BEOs for TFL 19 may lead to further reductions in timber supply.

In considering all of the above, I am convinced that it is appropriate at this time to reduce the harvest level of TFL 19. I determine that an appropriate harvest level for TFL 19 is 940 000 cubic metres per year, a level that is approximately 4 percent less than the current AAC. This level represents a reasonable reflection of:

- the uncertainties in the stability of mid-term timber supply;
- the apparent need to begin to step down towards the long-term harvest level over the next twenty years in order to minimize future disruptions in harvest flows; and
- the desirability of minimizing disruption to local and regional economies.

Determination

I have considered and reviewed all the factors as documented above, including the risks and uncertainties of the information provided. It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, that reflects current management practices as well as the socio-economic objectives of the Crown, can be best achieved on TFL 19 by establishing an AAC of 940 000 cubic metres.

This determination is effective August 1, 2001, and will remain in effect until a new AAC is determined, which must take place within five years of this determination.

If additional significant new information is made available to me, or major changes occur in the management assumptions upon which I have predicated this decision, then I am prepared to revisit this determination sooner than in the five years required by legislation.

Implementation

Over the next five years, I request that the licensee undertake the following tasks in order to inform the next AAC determination:

- to help assess the accuracy of operability categories, report annually to the regional manager, the area harvested by harvest method within each operability category, sorted by leading species and by height class.
- preferably on the basis of on-the-ground reconnaissance, confirm operability in the Upper Leiner and Burman River drainages.
- because terrain stability classes IV and V constitute a significant, sensitive portion of the assumed timber harvesting landbase, report annually to the regional manager on the amount of area harvested from each of terrain stability class IV and V areas, as delineated in terrain stability class mapping used for the base case analysis underlying this determination.

  The reported data should indicate leading species and height class, and be tabulated separately for slopes that are essentially:

  a) less than 80 percent; and,

  b) equal to or greater than 80 percent.
- track the incidence of, and amount of salvage related to, landslides, windthrow, insect outbreaks, and fire; and
- document harvesting practices in riparian management zones, as well as site productivity losses to roads, trails , and landings.

In addition, I encourage the licensee to undertake the tasks noted below. I recognize that the licensee's ability to undertake these projects is dependent on available staff resource time and funding. However, these projects are important to help reduce the level of risk and uncertainty associated with key factors affecting timber supply on TFL 19.

- complete the Terrestrial Ecosystem Mapping; and
- strengthen the basis for site index assumptions.

Finally I ask forest district staff to monitor watershed management issues and keep track of any related restrictions that arise to constrain harvesting.

Ken Baker

Ken Baker
Deputy Chief Forester
August 10, 2001

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, reads as follows:

Allowable annual cut

8. (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest areas and woodlot licence areas, and

(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or

(b) amends or enters into a tree farm licence to accomplish the result set out under section 39 (1) (a) to (d),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and

(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and

(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to

(a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and

(b) different types of timber and terrain in different parts of private land within a tree farm licence area.

(c) [Repealed 1999-10-1.]

(6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.

(7) The regional manager or the regional manager's designate must determine a rate of timber harvesting for each community forest agreement area, in accordance with

(a) the community forest agreement, and

(b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

(iii) silviculture treatments to be applied to the area,

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

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Appendix 2: Section 4 of the *Ministry of Forests Act*

Section 4 of the *Ministry of Forests Act* (consolidated 1988) reads as follows:

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to

(a) encourage maximum productivity of the forest and range resources in British Columbia;

(b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;

(c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are co-ordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;

(d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia; and

(e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Documents attached:

Appendix 3: Minister of Forests' letter of July 28, 1994

Appendix 4: Minister of Forests' memo of February 26, 1996

File: 10100-01

JUL 28 1994

John Cuthbert
Chief Forester
Ministry of Forests
595 Pandora Avenue
Victoria, British Columbia
V8W 3E7

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the clear responsibility for determining Allowable Annual Cuts, decisions with far-reaching implications for the province's economy. The *Forest Act* provides that you consider the social and economic objectives of the Crown, as expressed by me, in making these determinations. The purpose of this letter is to provide this information to you.

The social and economic objectives expressed below should be considered in conjunction with environmental considerations as reflected in the Forest Practices Code, which requires recognition and better protection of non-timber values such as biodiversity, wildlife and water quality.

The government's general social and economic objectives for the forest sector are made clear in the goals of the Forest Renewal Program. In relation to the Allowable Annual Cut determinations you must make, I would emphasize the particular importance the government attaches to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests.

Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.

.../2

Province of
British Columbia

Minister of
Forests

Parliament Buildings
Victoria, British Columbia
V8V 1X4

In addition to the provincial perspective, you should also consider important local social and economic objectives that may be derived from the public input on the Timber Supply Review discussion papers where these are consistent with the government's broader objectives.

Finally, I would note that improving economic conditions may make it possible to harvest timber which has typically not been used in the past. For example, use of wood from commercial thinnings and previously uneconomic areas may assist in maintaining harvests without violating forest practices constraints. I urge you to consider all available vehicles, such as partitioned cuts, which could provide the forest industry with the opportunity and incentive to demonstrate their ability to utilize such timber resources.

Yours truly,

Andrew Petter
Minister

Province of British Columbia
OFFICE OF THE MINISTER

Ministry of Forests

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

Re: The Crown's Economic And Social Objectives Regarding Visual Resources

Further to my letter of July 29, 1994, to your predecessor, wherein I expressed the economic and social objectives of the Crown in accordance with Section 7 of the *Forest Act*, I would like to elaborate upon these objectives as they relate to visual resources.

British Columbia's scenic landscapes are a part of its heritage and a resource base underlying much of its tourism industry. They also provide timber supplies that are of significant economic and social importance to forest industry dependent communities.

Accordingly, one of the Crown's objectives is to ensure an appropriate balance within timber supply areas and tree farm licence areas between protecting visual resources and minimizing the impact of such protection measures on timber supplies.

As you know, I have directed that the policy on management of scenic landscapes should be modified in light of the beneficial effects of the Forest Practices Code. In general, the new policy should ensure that establishment and administration of visual quality objectives is less restrictive on timber harvesting. This change is possible because alternative harvesting approaches as well as overall improvement in forest practices will result in reduced detrimental impacts on visually sensitive areas. Also, I anticipate that the Forest Practices Code will lead to a greater public awareness that forest harvesting is being conducted in a responsible, environmentally sound manner, and therefore to a decreased public reaction to its visible effects on the landscape. In relation to the Allowable Annual Cuts determinations that you make, please consider the effects that the new policy will have in each Timber Supply Area and Tree Farm Licence.

.../2

In keeping with my earlier letter, I would re-emphasize the Crown's objectives to ensure community stability and minimize adjustment costs as the forest sector moves to more value-based management. I believe that the appropriate balance between timber and visual resources will be achieved if decisions are made consistent with the ministry's February 1996 report *The Forest Practices Code: Timber Supply Analysis.*

Finally, in my previous letter I had asked that local economic and social objectives be considered. Please ensure that local views on the balance between timber and visual resources are taken into account within the context of government's broader objectives.

Andrew Petter
Minister of Forests